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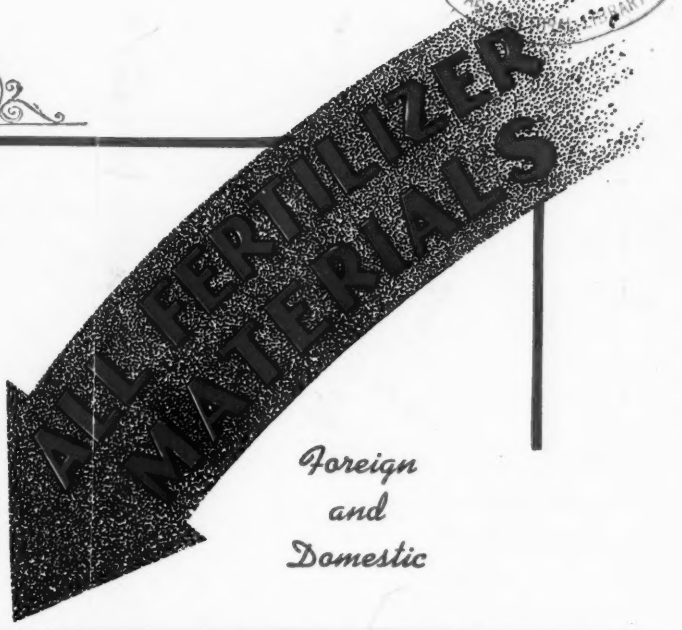

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See page 25

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Vol. 103 DECEMBER 15, 1945 No. 12

Production of Corn in the South*

By RALPH W. CUMMINGS

Head, Department of Agronomy and Assistant Director, North Carolina Agricultural Experiment Station

MANY of you have no doubt read the article entitled "Challenge to the Corn Belt" by J. Sidney Cates in the November issue of the *Country Gentlemen*. The present status of corn production in the South should at least present a challenge to all of us in the South. We still have a long way to go before we can present much of a challenge to the corn belt.

Approximately one-third of our crop acreage is in corn each year, the states of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, and Louisiana growing 21,259,000 acres or 22.5 per cent of the nation's total in the decade 1932–41. This 22.5 per cent of the acreage, however, produced only 13.8 per cent of the total corn. State average yields in this group ranged from 9.4 to 23.8 bushels per acre while the national average for the same period was 24.9 and the Ohio and Iowa averages were over 40 bushels. In 1943 with only slightly less acreage the same nine southern states produced only 9 per cent of the nation's corn. Yields per acre were slightly higher than in the 1932–41 decade, but in contrast Iowa's yield on over 10 million acres jumped from 40.5 to 59.0 bushels per acre.

Why have we lagged so much in the production of this, our most extensively grown crop? Several factors are responsible and fortunately we can do something about many of them.

Nitrogen the Number One Limiting Factor

Studies carried out several years ago pointed very strongly to the fact that nitrogen is the number one limiting factor in corn production. Only a few highlights of these studies will be reviewed here.

Dr. Hans Jenny in 1930 made a rather thorough study of the nitrogen content of the soils of the country in relation to climate (*1*)†. His data showed a progressive decrease in nitrogen content of soils with an increase in the mean annual temperature. In the semi-humid region he showed a decrease from near 0.48 per cent nitrogen at the 32° F. isotherm in Canada to around 0.05 per cent as the 70° isotherm was approached in the South. Above the 50° isotherm he showed a remarkable parallel between the nitrogen content of the soils and average corn yields which indicated strongly that the corn yields were a direct function of the nitrogen content of the soil. Within narrower geographic limits studies (*2*, *4*) in Missouri and Ohio showed that any soil management practice which affected the nitrogen content of the soil had a corresponding effect on the yield of corn grown on that soil without additional fertilization.

The table 3 reported in *Indiana Experiment Station Bulletin 482* (*5*) shows the approximate nutrient requirements of the corn crop.

A deficiency in any one of these will limit corn yields. Dr. Krantz demonstrated in one of his experiments this year how a lack of

*An address before the Fall Meeting of the National Fertilizer Association, Atlanta, Ga., November 13, 1945.

†Numbers in parentheses refer to "Literature" at end of paper.

minerals can limit corn yields by selecting a field where potash had been severely depleted and where soybeans showed severe potash deficiency in 1944. Where adequate nitrogen and phosphoric acid were supplied, yields from 0, 40, and 80 pounds potash applied were 31, 57, and 75 bushels per acre, respectively.

If I seem to emphasize nitrogen in this discussion, I want to make it clear that I do not intend to minimize the importance of the mineral elements in a fertilization program. I do wish to emphasize the fact that over a large portion of our corn fields in the South nitrogen is the number one limiting factor and unless we remove this limitation our efforts to improve yields by mineral fertilization directly to the corn crop will accomplish little. I will not attempt at this time, either, to discuss how the nitrogen problem may be attacked through mineral fertilization for legumes in rotation with corn.

What About Moisture?

Many of us have been hesitant to embark on a heavy fertilization program to overcome our natural handicap in corn production of a soil nitrogen supply for fear that moisture would be too serious a limiting factor. Too often the "firing" of the lower leaves has been cited as evidence that we have too little moisture to grow good corn. It is interesting, however, that this condition occurs in both wet and dry years. It can be corrected in both wet and dry years by supplying enough nitrogen. Time after time our experimental plots without nitrogen have fired up to the ear level and produced a few nubbins while adjacent plots well fertilized have remained green all the way to the ground and yielded heavily.

But how does our moisture supply during the critical part of the growing season compare with that of the corn belt? Table 4 shows a peak in the rainfall distribution in the months of July and August for two selected southern states with no such favorable situation for the corn belt state shown. More important than this, however, are the data on drought frequency shown in Table 5 from stations in the two regions. This shows a much lower drought frequency at the southern stations than is found in the corn belt. Total rainfall distribution by months and drought frequencies do not give a complete

TABLE 2

Corn production in thousands of bushels

	Av. 1932–41	1943
Virginia	33,718	33,275
Tennessee	63,829	65,964
North Carolina	45,496	51,028
South Carolina	22,898	24,720
Georgia	42,876	45,288
Florida	6,944	8,151
Alabama	43,597	48,510
Mississippi	42,365	43,508
Louisiana	22,618	23,018
	324,341	343,452
United States	2,349,267	3,076,159
Per cent of United States production grown in above nine states	13.8%	9%

TABLE 3

Approximate requirements of a 100 bushel corn crop

Nitrogen (N)	120 lb.
Phosphoric acid (P_2O_5)	45 lb.
Potash (K_2O)	100 lb.
Lime (CaO)	30 lb.
Magnesia (MgO)	30 lb.
Sulphur (S)	50 lb.
Water	20 inches

TABLE 1

	Acreage of corn harvested		Average yield per acre		Per cent acreage in hybrids	
	1932–41	1943	1932–41	1943	1944	1945
Virginia	1,412,000	1,331,000	23.8	25.0	25.2	40.0
Tennessee	2,807,000	2,868,000	22.8	23.0	9.7	14.0
North Carolina	2,404,000	2,319,000	19.0	22.0	2.1	4.0
South Carolina	1,722,000	1,545,000	13.3	16.0	0.6	1.0
Georgia	4,282,000	3,774,000	10.0	12.0	1.6	2.0
Florida	740,000	741,000	9.4	11.0	10.1	10.0
Alabama	3,447,000	3,234,000	12.6	15.0	1.8	2.0
Mississippi	2,884,000	2,807,000	14.7	15.5	4.3	5.0
Louisiana	1,561,000	1,395,000	14.5	16.5	3.7	6.0
Total	21,259,000	20,014,000	....	....	....	....
Ohio	3,527,000	3,516,000	40.4	49.5	94.0 (2.0% in 1936)	
Iowa	10,228,000	10,860,000	40.5	59.0	99.0 (2.1% in 1934)	
United States	94,511,000	94,790,000	24.9	32.4	57.0	

picture of the available soil moisture but these data do indicate a reasonably favorable situation in the South.

What About Hybrids?

Part of the yield increase in the corn belt in recent years has come about through the development of hybrids having a higher yield potential. Records show that only 2.1 per cent of Iowa's acreage was in hybrids in 1934 while virtually all of it has gone over to hybrids now. Table 1 shows a very small percentage of the acreage of the southern states in hybrid now. Many of the states have very good corn breeding programs, however, and we can expect to see this increase very rapidly in the near future. Development of hybrid lines producing very few barren stalks, high yields, resistance to ear worms, weevils, and other insects, disease resistance, good grain quality, and strong root and stalk systems resistant to lodging will do much to increase yield potentials. Experience with hybrids in North Carolina has shown rather consistent yields increase of 15 per cent to 30 per cent for adapted hybrids over the best open pollinated varieties. Many individual cases have gone much higher than this. Adoption of hybrids by farmers is limited at present chiefly by lack of sufficient seed stocks of the best adapted lines. It is estimated at 4 per cent of the total average in 1945 and will probably be 12 to 15 per cent of the total acreage in 1946.

TABLE 4
Average Distribution of Rainfall (inches)

	Alabama	North Carolina	Indiana	Iowa
January	4.84	3.75	3.05	1.09
February	5.21	3.99	2.41	1.08
March	5.75	4.21	3.69	1.72
April	4.50	3.56	3.55	2.70
May	4.12	4.02	4.04	4.04
June	4.20	4.69	3.90	4.65
July	5.36	5.96	3.35	3.68
August	4.53	5.53	3.32	3.60
September	3.52	3.90	3.29	3.80
October	3.02	3.27	2.79	2.36
November	3.41	2.62	3.05	1.60
December	5.41	3.82	2.74	1.18
Year	52.91	49.45	39.17	31.52

Plant Population

Three thousand to 4,000 plants per acre cannot produce high yields even if all other conditions are favorable. This population may be all right if we are satisfied with something near our present average yields. Closer spacing will reduce ear size and may cut yields slightly at very low fertility levels but is necessary if good yields are expected. Top yields at two locations in Dr. Krantz's experiments this year were 54 and 65 bushels per acre, respectively, with 4,000 plants per acre but were 83 and 86 bushels, respectively, at the same locations and with the same fertilization when 9,000 plants per acre were grown. Furthermore, the shading produced by the thicker planting and high fertility level reduced the weed growth so much that a third cultivation was unnecessary.

Cultivation

The root system of the corn plant is very extensive. Within a few weeks after germination the soil between the corn rows becomes filled with small roots. The greatest concentration of plant nutrients is usually found in the soil layer near the surface. Destruction of the corn roots in this layer of the soil by deep cultivation prevents the plant from making maximum use of the moisture and nutrients available. Implements designed for cultivation of cotton and tobacco are too often ill suited to cultivation of corn.

TABLE 5
Frequency of Drought Periods of Specified Length[s] During Critical Periods for Use of Fertilizer Nitrogen by the Corn Crop[1]

	No. of years 1898–1942 with droughts during specified period longer than				
	14 days	21 days	28 days	35 days	42 days
Raleigh, N. C., (June and 1st part of July)	17	3	2	0	0
Montgomery, Ala., (June and 1st part of July	21	6	4	3	2
Indianapolis, Ind., (July and 1st part of August)	40	21	9	6	1

[1]B. A. Krantz and J. A. Rigney assisted in the tabulation and summary of the weather data on which this table is based.

North Carolina Experiments in 1944

Using the best adapted hybrids available for each location, Dr. B. A. Krantz laid out eleven fertilizer experiments with corn in 1944. A standard spacing was adopted which gave approximately 9,000 plants per acre. Fertilizer at planting was side-placed to avoid injury. Shallow cultivation was practiced. Effects of nitrogen were studied under conditions in which adequate phosphate and potash were supplied. Likewise effects of phosphate and potash, respectively, were studied under conditions of adequate supplies

(Continued on page 28)

Pasture Fertilization*

By H. R. LUSH
Pasture Specialist, The National Fertilizer Association

R. H. Lush, Pasture Specialist of the National Fertilizer Association, is a native of Iowa and received his education in Kansas, Minnesota and Wisconsin. Before joining the staff of the Association, he was a member of the faculty of Louisiana State University

THE South has 29 per cent of the livestock on 34 per cent of the farmland in the United States. In the United States there are 9 per cent more livestock units than the previous 10-year average. Meat production in 1944 increased 37 per cent as an average of the previous 5 years. Hay, pasture, and other forage crops supply about 60 per cent of all the feed required by all livestock. If livestock are to be most profitably maintained, pastures and fields must provide more days of grazing throughout the year by means of better pasture management. This involves a sufficient supply of plant food and of suitable liming materials for desirable pasture plants to make enough growth, and regulation of the number of livestock and periods of grazing to give uniform production.

The first American effort to measure the effect of fertilizers and lime on pastures was started over 50 years ago. The results were published as Rhode Island Station *Bulletin No. 66.* The limed plots produced 2.5 times as much green material as the unlimed plots. But all fertilized, limed plots averaged 4 times as much green material as the unfertilized, limed plots. The best clover grew on the plots which had also received potash and phosphoric acid, and plots receiving nitrogen in addition averaged 1.9 times as much green weight as those receiving only potash and phosphoric acid.

*Address delivered at the Fall Meeting of the National Fertilizer Association, Atlanta, Ga., November 13, 1945.

Each passing year of research piled up more evidence that no grass or legume can continue to be produced with a maximum of profit unless the fertility of the soil is maintained at a high level. Hundreds of experiments and thousands of demonstrations in pasture improvement reaching into every State have confirmed this.

Improvement of pastures by use of fertilizers has progressed rapidly in recent years, and in 1942 nearly 1,300,000 tons were used on about 11,000,000 acres. An estimate indicated 22 per cent of the total fertilizer was used on corn, 14.6 per cent on cotton, 16.0 per cent on vegetables including potatoes, 12.8 per cent on pasture and hay, and 14.1 per cent on small grains, much of which is pastured. Between 1942 and 1944, total fertilizer use has increased 20.6 per cent. If usage has increased on grassland in the same proportion as on other crops, that means 1,545,000 tons so used. Added to this would be about 690,000 tons for that used on small grains pastured part time, and 200,000 tons for other supplementary grazing and hay crops in the Southern States. With further allowance for grains pastured and for supplementary grazing crops in other sections, it is probable that 2,650,000 tons of fertilizer are now used to grow forage crops or about the same amount as for corn. That is, crops mainly for livestock feed production represent about 45 per cent of the total fertilizer use. The 1944 survey now in process of tabulation will give more data on the subject by crops and States.

Quality Forage Needed

More feed, especially forage of high quality produced at a minimum labor, machinery and soil cost, is an essential part of a livestock program in every section of the country. Livestock, in spite of many scientific advances, are still not generally well fed or most economically fed. Pasture is the cheapest feed that can be grown on any farm for any kind of livestock. Especially is that true here in the South. Experiments indicate that

one ton of complete fertilizer containing 20 per cent plant food will produce increased grazing sufficient to produce 8,000 pounds of milk or 1,000 pounds of gain in liveweight. Certainly that is a profitable exchange for the livestock farmer at present prices.

Areas in the United States that have sufficient rainfall or irrigation for such profitable improvement are approximately 80,000,000 acres of plowable pasture; 100,000,000 acres each of woodland pasture and of "other" pasture; 50,000,000 acres of tame hay crops and 40,000,000 acres of small grains, much of which can be advantageously pastured. While 30 per cent of the small grains are fertilized at an average rate of 200 pounds per acre, only 3 per cent of the permanent pasture receives fertilizer. But of the total fertilizer used in New Hampshire, a grassland State, about 18 per cent is applied to hay crops and 13 per cent to pastures. The opportunity for expansion and heavier rates per acre is unlimited. Prof. E. Truog has stated that Wisconsin could profitably use 20 times as much nitrogen on pastures as in 1944.

Fertilize Liberally

But the individual livestock farmer wishes to know how fertilizing forage crops can help him. Each 1,000-pound animal sold represents an equivalent loss of 80 pounds of 20 per cent superphosphate. An average cow will eat the equivalent of 2 tons of dried pasture grass during the Southern grazing season. That much feed causes a net loss from the soil of 57 pounds of nitrogen, 13 pounds of phosphoric acid, and 28 pounds of potash. If manure is not properly conserved with superphosphate and returned, or if the crop is removed as hay, losses are even greater. Some of the nitrogen removed can be replaced by growing adapted legumes, preferably in combination with grasses. But legumes are not successfully grown on enough acres, largely because not enough calcium, phosphoric acid, potash, frequently nitrogen, and perhaps boron, copper, manganese, and zinc on some sandy soils, are supplied to the soil. For soils that have been reduced to a low state of fertility, the amount of fertilizer required to establish legumes is much larger than the amount ordinarily used. A remedy is to treat any one pasture or field liberally in the beginning and thus save labor, soil, seed, time, and money.

The application of 200 pounds of phosphoric acid per acre in several treatments at Lufkin, Texas, aided in rapid establishment of adapted clovers and grasses and showed beneficial effects for 9 years. There was some decline in production 5 years after treatment. Maine experiments indicate that excellent permanent pastures require for maintenance the annual application of about 60 pounds each of nitrogen, phosphoric acid, and potash per acre, whether from fertilizer, manure or from legumes. A heavy application at the time of preparing the land for new seeding also permits placing the fertilizer at a depth of 1 to 2 inches, an advantage in efficiency of use. Work at Marion Junction, Alabama, showed that 1,200 pounds of superphosphate used once in 3 years produced 35 pounds more beef per acre than 400 pounds applied annually.

Ten years of experiments at Tifton showed that unfertilized carpet grass pasture produced 80 pounds of beef per acre, while carpet grass and legume pasture fertilized with the equivalent of 500 pounds of 5-10-5 produced 320 pounds of beef per acre at a cost of approximately 4 cents per pound at present fertilizer prices. In Virginia experiments, 90 to 100 pounds of beef per acre were produced without fertilizers and 317 pounds per acre with fertilizer. Beef produced from improved pasture alone, and beef produced with a ration of grain, graded the same, sold for the same price and had the same dressing yield.

The addition of adapted legumes or grains to provide a longer and more adequate grazing season makes fertilizer application more profitable. Experimental work at Gainesville, Florida, has shown that unfertilized carpet grass produced an average of 72 pounds of beef per acre; fertilized carpet grass produced 141 pounds of beef; fertilized carpet grass and lespedeza produced 250 pounds of beef; but fertilized carpet grass and clovers produced 752 pounds of beef.

Dairy farmers can likewise profit by use of good management practices. At Lewisburg, Tennessee, mowing increased net returns of bluegrass by $10 per acre; reseeding and liming by $31 per acre; superphosphate and liming by $38 per acre; but reseeding with grass and Ladino clover, liming, manuring, fertilizing, and mowing by $96 per acre.

Fertilization also helps the succeeding crop in a rotation. In Louisiana, unimproved pasture produced 85 pounds of beef per acre and when later seeded to rice produced 15.2 barrels of rice per acre; pasture seeded, fertilized, and limed produced 220 pounds of beef per acre and when seeded to rice 21.6

(Continued on page 26)

The Plant Food Aspects of Crop Production

By JACKSON B. HESTER*

IT IS a commonplace fact of agricultural science that minerals of the soil make up less than five per cent of the plant and water, carbon, and nitrogen constitute the remaining portion. This five per cent seems so small that perhaps one might be inclined to overlook its importance, but a review of the literature reveals to what great extent minerals have influenced the evolution of life. Not only can the development of plant life be traced to the abundance of certain elements in the soil, but the evolution and development of man and other animals may be likewise correlated with the abundance or absence of elements in the soil (*4*)†. Perhaps another reason for the importance of minerals is that while nature has made air and water free, the essential plant nutritional elements in the soil are less accessible. Be that as it may, the maximum production of a crop depends upon an essential supply of certain plant nutrients. This has been much discussed in the current literature (*5*, *6*). No simple means have been devised whereby the plant may be supplied these plant nutrients. Certain crop requirements have been developed and it is this phase of the subject that is under discussion.

Crop Requirements

The amount of nutrients in the plant varies tremendously and chemical analyses of plants do not necessarily reveal the ideal or required amount of plant food necessary to produce a crop. Enough chemical analyses and sufficient study of a crop may be made to establish the approximate amount required to produce an abundant crop. Such work on the tomato plant seems to point to the fact that an acre of land producing ten tons of tomatoes harvested commercially (actually 12½ tons on the vine) need about the following amounts of the following elements: Calcium, 93 pounds; Magnesium, 15; Nitrogen, 107; Sulphur, 7; Phosphorus, 15; Potassium, 163; Iron, 0.47; Manganese, 0.65; Boron, 0.055; Copper, 0.08; Zinc, 0.12; and Molybdenum, 0.003 pounds (*1*, *3*). All of these elements are essential and must be present in the above amounts if a crop of this proportion is to be grown. The fact that enough nitrogen, phosphorus, and potash is added does not mean that the remaining elements will be available in the soil. In fact, it has been established that a lack of boron or of manganese is a limiting factor in maximum production in many sections and copper, zinc, and iron in others.

The elements occur in the fruit and vines in the manner shown in Table 1. These data show that certain of the elements like calcium and magnesium are concentrated in the vines and certain other elements like nitrogen and potassium are concentrated in the fruit, and that still others (copper and zinc) are distributed in both. In the over-all picture of commercial production, how much is required and from what sources can it be derived?

Composition of Manure

Manure has been considered by many as essential in the economical production of tomatoes and it can be said, without reservations, that no better source of plant food has been developed than manure supplemented with commercial fertilizer. From this standpoint, it may be interesting to look into the chemical analyses of manure. It must be borne in mind that manure varies tremendously in composition, depending upon the source from which it is derived. Perhaps that is the reason there has been so few complete analyses made of manure. The writer has made a fairly complete chemical analyses of animal manure and found it to contain eighty per cent water and twenty per cent dry matter; that is, ten tons of ordinary manure contained two tons of the dry product. The four thousand pounds of dry manure contained the following minerals: Calcium, 46 pounds; Magnesium, 12; Nitrogen, 74; Sulphur, 6; Phosphorus, 17; Potassium, 82; Iron, 15; Manganese, 6; Boron, 0.14; and Copper, 0.07 pounds.

*Soil Technologist, Campbell Soup Co., Riverton, New Jersey.

†See references at end of article.

In addition to these elements, there are perhaps 1,600 pounds of carbon and the remaining portion is made up of hydrogen and oxygen.

The composition of tomatoes is strikingly similar in the trace elements to that of the manure. All of the elements of manure are not available to the first crop, but if we assume that 50 to 60 per cent of the elements in manure is available to the first crop, it is little wonder that manure has so much value as a soil amendment.

To date, manure or crop residue has not been replaced with commerical supplements as a soil amendment. Assuming that 60 per cent of the manure is available to the first crop, the growing crop would have available from ten tons of manure roughly the following amounts: Calcium, 27 pounds; Magnesium, 7; Nitrogen, 44; Sulphur, 4; Phosphorus, 10; Potassium, 49; Iron, 9; Manganese, 4; Boron, 0.08; and Copper, 0.04 pounds. Although from this it is clear that manure is an invaluable source of plant food, it is not entirely adequate and must be supplemented by commercial fertilizers.

Composition of Commercial Fertilizers

Commercial fertilizers vary tremendously in analyses and formulae. The best information on the composition was found in the work of Lundstrom and Mehring (*2*). The average analyses of fourteen different samples showed the following results for 1,000 pounds of fertilizer: Calcium, 118 pounds; Magnesium,

(Continued on page 22)

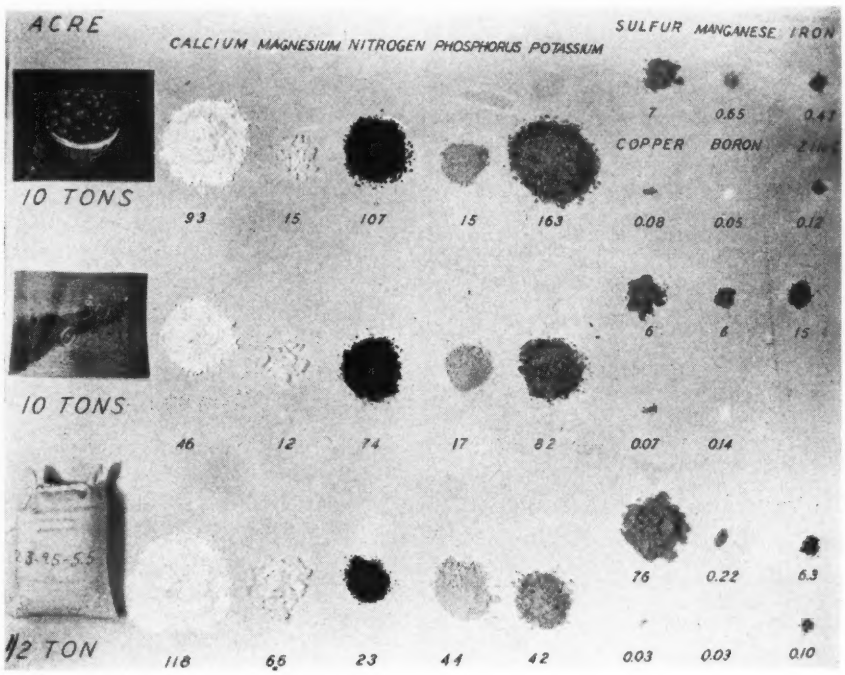

FIG. 1. Illustration of the mineral and nitrogen content of ten tons of tomatoes (vines included), ten tons of manure and one-half ton of fertilizer

TABLE 1

Lbs. per Acre	Ca	Mg	N	S	P	K	Fe	Mn	B	Cu	Zn	Mo
Fruits.....25,000*	4	4	62	–	7	72	.07	.05	.005	.02	.05	.002
Vines..... 2,500**	87	11	45	7	8	92	.40	.60	.05	.06	.07	.001

*Green Weight **Dry Weight

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Early Fertilizer Buying is Urged

Farmers have been requested by the U. S. Department of Agriculture to do their fertilizer buying early.

In advising farmers to make sure they will have their fertilizer on hand when needed, L. B. Taylor, of the Production and Marketing Administration, stated that "while supplies of raw materials to make fertilizers are estimated to be slightly more than in the 1944–45 season, there is the possibility of production and delivery congestions which will be more acute if farmers wait to the last minute to order out their fertilizers.

"Early purchase and farm storage of fertilizer provide insurance against the possibility of running short at planting time," Mr. Taylor stated. "The early movement of fertilizer is the key to a plentiful and satistory distribution of plant food in 1946 just as it was in the previous years."

Although started as a wartime necessity, the practice of farmers storing fertilizer during the winter months has demonstrated its practicability and advantage to the user. Last spring about 30 per cent of all the fertilizer used had been in farm storage for at least a part of the winter. Anticipating that many farmers will follow this practice this year, the Department offers these suggestions:

(1) Be sure to store fertilizer in a dry building where the flooring is above the ground. Never store fertilizer on the earth itself. (2) Stack bags close together to reduce the absorption of moisture from the air. (3) Exercise care in handling fertilizer so as to avoid breaking bags, as loose fertilizer would damage the good bags. (4) Make separate stacks of mixed fertilizer, superphosphate, ammonium nitrate or any other type of material. This makes it easier to clean up and keep separate if accidentally spilled. (5) As a precaution keep sodium nitrate and ammonium nitrate away from hay, feeds and organic meals to prevent fires and be sure to burn all empty bags from which the sodium and ammonium nitrates are emptied. (6) Protect farm animals by keeping them away from stored sodium nitrate and ammonium nitrate which might be injurious if eaten by them.

More than 32,000 tons available nitrogen, equaling 200,000 tons nitrate of soda, are leached from Tennessee soils each year.
—*Tennessee Extension Service.*

Murph Recovering from Auto Accident

His many friends in the industry were sorry to hear that D. S. Murph, Executive Secretary and Treasurer of the National Fertilizer Association, is in the Doctors Hospital in Washington as the result of an accident on November 29th. He was struck from behind by an automobile being backed along the sidewalk in front of a parking lot and suffered a vertical fracture in the small bone and joint of his right leg. According to latest reports, he is making satisfactory progress and expects to leave the hospital in a few days.

Fertilizer Helps Win 4-H Corn Honors

For the second straight year, Junior Merle Hester, of Juka, Tishomingo County, Miss., won the State 4-H Club Corn Growing Contest with a yield of 130½ bushels per acre. In 1944 he led with 118⅜ bushels per acre.

With planting delayed until June 1st because of wet weather, Junior used 500 lb. of a 6–8–8 fertilizer on his acre plot, and followed this with a top-dressing of 100 lb. of nitrate of soda on June 27th. In order to check his results, he planted two other plots, using 30 lb. of nitrogen at planting and a top-dressing of 100 lb. of nitrate of soda on the one, and no fertilizer at all on the other. The yields from these two plots were 93 and 70½ bushels per acre, respectively.

Besides the awards and honors, Junior was given a trip to the 4-H Club Congress in Chicago.

Etheridge Succeeds Hand as Mississippi State Chemist

Dr. W. F. Hand, Mississippi State Chemist, retired on October 1st. He is continuing his office as vice-president of Mississippi State College but has turned over his duties as dean of the School of Science to Dr. Clay Lyle. Dr. Hand has served with distinction for more than fifty years and has been the recipient of many honors in the field of agronomy. He has also served as president of the Association of Official Agricultural Chemists.

Dr. M. P. Etheridge has been appointed to the office of State Chemist. He will also head the Department of Chemistry at the College. He has served as Assistant State Chemist since 1922.

Deal Joins Nitrogen Products Staff

Nitrogen Products, Inc., New York City, announces that Richard E. Deal has been elected a Director and Secretary of Nitrogen Products, Inc., and its subsidiaries, Benzol Distributors, Inc., and Fertilizer Forwarding Corporation.

Mr. Deal has just completed four and a half years as a Lieutenant-Commander in the U. S. Navy where he was Operations Officer of several Naval Air Stations. Before being recalled into the Navy Mr. Deal had been employed for eight years by The Barrett Division of Allied Chemical & Dye Corporation.

Mente & Company in New Plant

Mente & Company, well-known manufacturers of burlap and cotton bags in New Orleans, have moved to their new plant at Montegut and Villere Streets. They are now in a new, air-conditioned building which will greatly increase the efficiency of operations and will permit a larger output, while at the same time giving more flexible control to meet the increasing variety of bags and allied products which the company manufactures.

September Superphosphate Production

Production of superphosphate during September, according to the Bureau of Census figures, totaled 650,087 tons (basis 18 per cent), a decrease of 6.5 per cent from the August output but an increase of 23 per cent over September, 1944. Shipments also declined at an even larger rate, so that at the end of the month stocks on hand of normal, concentrated, and base goods were higher than on August 31st.

	Normal	Concentrated	Base goods
	18% APA	45% APA	18% APA
Production	Tons	Tons	Tons
September, 1945	587,428	23,694	3,424
August, 1945	638,046	21,617	2,819
September, 1944	473,390	21,008	3,319
Shipments and Used in Reporting Plants			
September, 1945	589,585	18,731	2,026
August, 1945	605,503	24,006	1,004
September, 1944	459,724	25,704	1,599
Stocks on Hand			
September 30, 1945	827,856	31,593	6,255
August 31, 1945	813,694	26,204	4,857
September 30, 1944	783,274	31,879	7,465

November Tag Sales

A decline in fertilizer tax tag sales from last year was reported for November, following a very sharp increase in October. Declines from November, 1944, took place in nine of the reporting States, with the effect of this only partially offset by increases in the other eight. Tag sale statistics are compiled and reported by The National Fertilizer Association on the basis of sales records of State control officials.

Total November sales in the 17 States represented 475,000 equivalent tons, a decline of 19 per cent from November, 1944. With the exception of last year, however, sales in the month were the largest ever reported for any November. They were 4 per cent larger than in November, 1943.

Total sales in the January-November period amounted to 7,590,000 equivalent tons, representing an increase of 643,000 tons, or 9 per cent, over the corresponding period of 1944. Moderate declines from last year were reported by Mississippi and Arkansas and a negligible drop occurred in Kansas. Sales this year have been at all-time high levels.

Fall sales in both regions have made new records this year. July-November sales in the South were about three times as high as in the pre-war period, 1935–1939, while sales in the Midwest were two and a quarter times as high. The sharp increases in the last three years were of course due in part to the increased demand for fertilizer for use on fall-planted crops. They were also due in part to the earlier buying of fertilizer for use in the spring season. Government agencies, farm organizations and the fertilizer industry cooperated during the war period in a program to get farmers to buy early. Due to war conditions it was necessary to spread the pro-

(Continued on page 30)

FERTILIZER TAX TAG SALES
Compiled by The National Fertilizer Association

State	November				January–November		
	1945 Tons	1944 Tons	1943 Tons	% of 1944	1945 Tons	1944 Tons	1943 Tons
Virginia	37,161	25,479	13,350	120	568,877	475,125	448,081
North Carolina	63,291	106,068	77,631	109	1,332,047	1,226,372	1,272,496
South Carolina	34,150	52,900	58,680	107	759,410	710,693	816,903
Georgia	58,142	51,106	59,240	108	1,047,844	971,569	995,977
Florida	100,703	101,724	96,830	110	817,173	744,254	655,760
Alabama	20,350	32,000	54,250	111	685,850	620,350	698,050
Mississippi	15,250	50,310	29,831	91	352,807	388,874	453,045
Tennessee	6,388	12,699	7,219	105	273,590	260,070	226,485
Arkansas	750	11,000	8,960	94	114,150	121,583	174,665
Louisiana	10,500	8,150	9,900	106	224,010	211,445	193,268
Texas	23,343	22,910	8,250	111	215,198	193,624	163,400
Oklahoma	2,000	2,750	900	121	24,312	20,101	18,988
Total South	372,028	477,096	425,041	108	6,415,268	5,944,060	6,117,118
Indiana	79,591	90,707	12,290	113	488,197	430,150	396,080
Illinois	12,650	10,050	14,886	142	231,164	163,140	103,066
Kentucky	8,650	8,028	4,681	114	270,796	237,737	159,388
Missouri	770	85	156	109	147,404	135,086	89,717
Kansas	1,005	75	0	99	37,620	37,771	16,279
Total Midwest	102,666	108,945	32,013	117	1,175,181	1,003,884	764,530
Grand Total	474,694	586,041	457,054	109	7,590,449	6,947,944	6,881,648

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FERTILIZER MATERIALS MARKET

NEW YORK

Sulphate of Ammonia Production Recovers from Slump. Early Buying of Nitrate of Soda Urged. No Change in Scarcity of Organics. Superphosphate Supply Still Short. Phosphate Rock and Potash Have Transportation Troubles.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, December 13, 1945.

Sulphate of Ammonia

After the decided drop in production shown in October and November, the output of sulphate of ammonia has again risen to about the level maintained during the war years. Current contracts, however, will take all of the current production and shipments are still behind schedule. There is practically no resale material on the market.

Nitrate of Soda

The government is again urging farmers to take early deliveries of nitrate of soda to insure an adequate supply on hand next spring. This has resulted in some increase in buying, but stocks on hand are adequate to assure prompt shipment of all orders. Official sources indicate smaller importations of nitrate are indicated for the coming months, owing to the increased demand from European markets.

Organic Materials

While some increase in production of tankage, dried blood and fish scrap are reported, the supply is still far behind demand for both feed and fertilizer use. The market is extremely tight and ceiling prices prevailed. The recent lifting of the ceiling on imported organic materials has so far had little effect in increasing foreign shipments.

Superphosphate

The old bugaboo of labor shortage is still plagueing producers in many sections. Prospects for a distinctly increased production this year are slight and the supply is falling short of demands from both domestic and foreign sources. Export inquiries are increasing and this further complicates the situation.

Phosphate Rock

Rock producers are having difficulty securing adequate transportation for shipments, which are increasing due to the greater demand for superphosphate. Export business is getting heavier and helps to create a very tight market in phosphate rock.

Potash

A shortage of box cars has caused contract shipments to fall behind schedule. Current contracts for domestic use and for export have taken practically the entire year's output and no resale material is on the market at the present time.

CHARLESTON

Organics Still Scarce. Steel Strike Would Hurt Sulphate of Ammonia Production. Phosphate Rock Market Tight.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, December 11, 1945.

Organics.—No relief on this situation; all organics continue extremely scarce.

Sulphate of Ammonia.—Fertilizer manufacturers are very much worried for, if a steel strike does develop, the season's supply will be even shorter than estimated.

Nitrate of Soda.—It is now estimated that imports of Chilean are expected to be 300,000 tons less than 1944–45.

Phosphate Rock.—The tight situation on this continues and at present all the prospective tonnage for the season is under contract.

Superphosphate.—The production in the third quarter of 1945 was 259,000 tons above the production of 1944 for the same period.

Sulphur production in the United States totaled 341,060 tons, a decrease of 5,000 tons from the August output. Mine shipments dropped from 350,961 tons in August to 256,317 tons in September.

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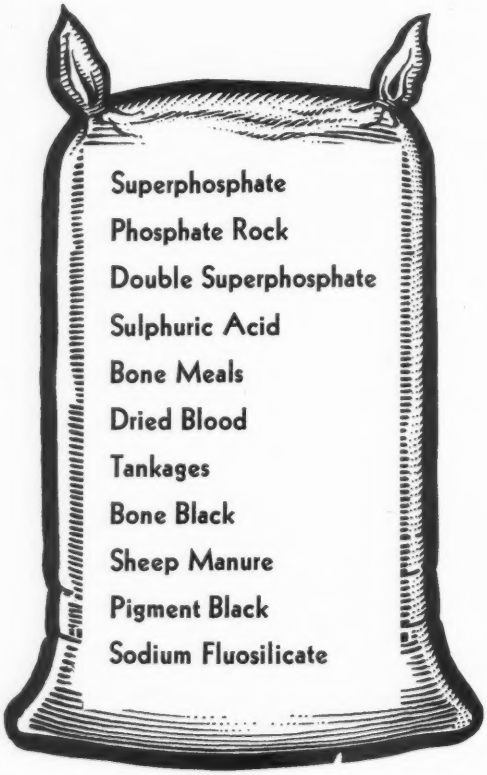

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CHICAGO

No Relief in Sight for Shortage of Fertilizer Organics. Feed Material Demand Strong at Ceiling Prices.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, December 10, 1945.

Extreme lack of organic or bone mea offerings are still noted in the market. Urgent demands are made but remain unsatisfied. Buyers are quite concerned over this situation with no solution in sight.

Meat protein feeds are as tight as ever despite somewhat heavier livestock receipts. Demand is very strong for tankage and blood, at full ceiling prices.

Ceiling prices are:

High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.86 per unit N) and 10 cents; standard grades crushed feeding tankage; $5.53 per unit ammonia ($6.72 per unit N); blood, $5.53 ($6.72 per unit N); dry rendered tankage, $1.25 per unit of protein, f. o. b. producing points.

California Fertilizer Association Holds Successful Convention

The annual convention of the California Fertilizer Association was held in San Francisco on November 8, 9, and 10. An attendance of more than 200, a well-rounded program covering the scientific as well as the commercial aspects of fertilizer use and production, and the intelligent discussion by the members present, all contributed toward a most successful meeting.

The speakers included Ashley Brown, Principal Agricultural Specialist; M. E. McCollam of the American Potash Institute; James Mussatti of the California Chamber of Commerce; Weller Noble, president of Pacific Guano Co.; Edson Abel of the California Farm Bureau. The latter's talk brought to light numerous misunderstandings which were quickly cleared up by the discussion which followed.

A plan to establish a permanent office of the association with a full-time Secretary, to be financed through a tonnage assessment, was discussed. An income of $30,000 from 10 cents per ton on mixed fertilizers and 5 cents per ton on materials was considered probable and the Board of Directors were instructed to obtain from each company represented at the meeting its thoughts on the subject, based upon participation by 70 per cent of the state tonnage.

A resolution regarding the proposed fertilizer legislation in Congress was presented and, after amendment, was adopted as follows:

Whereas: Post war plans for agriculture have been advanced by many groups purportedly interested in serving farm people and protecting the national welfare, and

Whereas: The formulation of programs and policies vital to agriculture are being evolved, and

Whereas: The industry represented by this association is most intimately concerned with the basic part of agricultural programs and policies, namely soil fertility in all its many ramifications, and

Whereas: A national policy for fertilizers has been singled out by several groups for presentation and federal legislative action in Senate Bill 882 and House of Representatives Bill 2922, now therefore be it

Resolved: (1) That it is the opinion of this association that the legislation mentioned and any other similar proposals which embrace but one part of the problem confronting agriculture should be scrutinized most carefully by the members of our Congress for possible selfish, political and un-American

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motives potentially destructive of our national welfare.

(2) That duplication, inter and intra animosities of agencies or organized groups, uncoordinated actions and similar wasteful procedures be not further aided and abetted by the enactment of legislation which will initiate unadapted agricultural programs.

The following three members were elected to the Board of Directors: Ned Lewis, Wilbur-Ellis Co.; Wallace Macfarlane, Pacific Guano Co.; Earl R. Mog, Growers Fertilizer Co. Following the meeting the Directors elected the following officers for the coming year: President, Ned Lewis; Vice-President, Wallace Macfarlane; Secretary, Paul Pauly; Treasurer, G. C. Dunford.

Potash Production Still at Peak

The total potash delivered in the United States, Canada, Cuba, Puerto Rico and Hawaii during the third quarter of 1945 by the five major American producing companies amounted to 365,530 short tons of potash salts containing an equivalent of 202,091 tons K_2O, according to the American Potash Institute. Agricultural deliveries amounted to 333,109 tons of salts, equivalent to 181,864 tons K_2O, comprised of 270,642 tons muriate of potash, 20,229 tons of manure salts and 42,238 tons of sulphate of potash and sulphate of potash-magnesia. Deliveries to the chemical industry amounted to 32,421 tons of muriate of potash and sulphate of potash, equivalent to 20,227 tons K_2O.

During the first nine months of 1945, total deliveries to United States, Canada, Cuba, Puerto Rico, and Hawaii amounted to 1,187,051 tons of potash salts containing an equivalent of 643,537 tons K_2O. These were an increase of 10.6 per cent in salts and 10.8 per cent in K_2O over the corresponding period in 1944. Potash for agricultural use consisted of 1,076,675 tons of salts equivalent to 574,828 tons of K_2O, representing increases of 10.5 per cent in salts and 10.8 per cent in K_2O. Agricultural salts consisted of 835,454 tons of muriate of potash, 119,011 tons of manure salts, and 122,210 tons of sulphate of potash and sulphate of potash-magnesia. Deliveries to the chemical industry amounted to 110,376 tons of muriate of potash and sulphate of potash, equivalent to 68,709 tons K_2O, representing increases of 11.1 per cent in salts and K_2O over the first three quarters in 1944.

Drop in October Sulphate of Ammonia Output

The production of by-product sulphate of ammonia during October showed a decline of over 21 per cent from the September figures, according to the statistics of the U. S. Bureau of Mines. The drop from the production of October, 1944, was even more pronounced—from 69,772 tons to 49,298 tons. Shipments also decreased 18.6 per cent, while stocks on hand at producers' plants on October 31st were only 22,848 tons. For the first ten months of 1945, production was 6 per cent less than the same period of 1944.

	Sulphate of Ammonia	Ammonia Liquor
Production	Tons	Tons NH_3
October, 1945	49,298	1,996
September, 1945	62,642	2,267
October, 1944	69,772	2,716
January-October, 1945	640,093	23,073
January-October, 1944	681,479	26,575
Sales		
October, 1945	52,843	1,918
September, 1945	64,896	1,902
October, 1944	71,455	2,536
Stocks on Hand		
October 31, 1945	22,848	916
September 30, 1945	26,402	1,028
October 31, 1944	77,046	678

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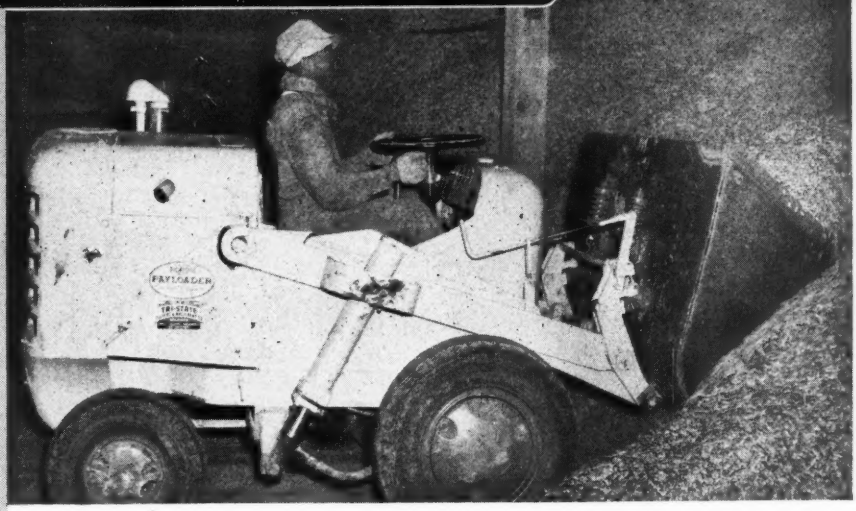

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Oregon Plant to Produce Sulphate of Ammonia

Arrangements have been made for the manufacture of sulphate of ammonia at the new aluminum plant at Salem, Oregon. The plant is operated by the Columbia Metals Corporation as agents for the Reconstruction Finance Corporation. Plans have been made to produce from 2,500 to 5,000 tons of sulphate. The entire output has been purchased by the Oregon State College Extension Service and distribution will be handled by the Woodburn Feed and Supply Co., through local dealers.

More Farms in Eastern States

While the farm acreage of the United States appears to have reached the greatest total in the Nation's history, according to preliminary returns of the 1945 Census of Agriculture, the number of farms has decreased by 2.5 per cent. This is offset by an increase of 9.8 per cent in the average size of the individual farm, from 173 acres in 1940 to 190 acres in 1945.

The decrease in the number of farms is in the middle-western and Rocky Mountain states as the figures show an increase of 4.8 per cent in the number of farms along the eastern and western seaboards. The average farm size in these latter sections has also increased from 131 acres to 133 acres.

Nitrate Doubles Rye, Oats Yields

D. H. Roark of Simpson County, Ky., told Farm Agent Woodrow Coots that he is a firm believer in the use of ammonium nitrate, having used it on rye and oats. In April, he top-dressed a field of balbo rye with 100 pounds per acre, leaving a part untreated as a check. The untreated portion made eight bushels per acre as against 19 bushels on the treated area. Mr. Roark further stated that he had less fly damage on the treated portion. Ammonium nitrate increased the yield of oats from 30 bushels to 60 bushels per acre, he said.—*Kentucky Extension Service.*

THE PLANT FOOD ASPECTS OF CROP PRODUCTION

(Continued from page 13)

6.6; Nitrogen, 23; Sulphur, 76; Phosphorus, 44; Potassium, 42; Iron, 6.3; Manganese, 0.22; Boron, 0.031; Copper, 0.031; and Zinc, 0.096 pounds. The average fertilizer, at the rate of 1,000 pounds to the acre, falls short of supplying enough magnesium, nitrogen, potassium, boron, copper, and zinc for one acre of tomatoes. Further, it is not known how much of the trace elements in fertilizer is available to the crop or how much is lost by leaching or actual fixation by the soil. There are 76 pounds of sulphur in 1,000 pounds of fertilizer. The tomatoes absorbed less than 10 pounds of sulphur leaving some 66 pounds not utilized. Also, there are some 55 pounds of chlorine in 1,000 pounds of fertilizer, but only a few pounds are absorbed by the plant. So, some 66 pounds of sulphur and 50 pounds of chlorine are lost by leaching. The sulphur and chlorine do not leave the soil as the element alone, but as some salt of the element. If the soil is well limed, most of the sulphur is leached from the soil with calcium and magnesium. So, the 66 pounds of sulphur would carry with it 115 pounds of calcium, or its equivalent in potassium and magnesium. In leaching, the chlorine would carry with it 40 pounds of calcium, or its equivalent in magnesium, potassium or sodium. Commercial fertilizer has 118 pounds of calcium, 7 pounds of magnesium, and 35 pounds of sodium, but the unused secondary elements (sulphur and chlorine) that it also contains causes about this amount to be leached from the soil. Therefore, the commercial fertilizer can be counted upon for only a part of the nitrogen, phosphorus, potassium and some of the trace elements. This means that commercial fertilizers do not supply all of the elements which are essential to soil fertility.

If manure is not available on the farm, it must be replaced by crop residue. If corn is grown in the rotation, remove the grain and return the stalks; if wheat, oats or rye are grown in the rotation, return the straw; if soybeans or legumes are grown, return the vines and stubble. This procedure gives a

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cash income and returns minerals and organic matter to the soil.

Liming Materials

It has been shown that manure does not supply enough calcium and magnesium and, since the calcium and magnesium contained in commercial fertilizers are lost by leaching, liming materials must be used to supply the remaining requirements in crop production. Likewise, the acidity of the soil must be partially neutralized by lime.

The illustration in Fig. 1 gives a graphic picture of the elements in 10 tons of tomatoes, 2 tons of dry manure and one-half ton of commercial fertilizer. It is believed this gives an over-all picture of the subject discussed. Therefore, every soil fertility program must be built around the following three principles: (1) a system of crop rotation whereby organic residue is returned to the soil (either manure or crop residue), (2) liberal use of commercial fertilizer, and (3) liberal use of lime.

Summary

A comparison of the chemical analyses of 10 tons of tomatoes, 10 tons of manure and one-half of commercial fertilizer for calcium, magnesium, nitrogen, sulphur, phosphorus, potassium, iron, manganese, copper, boron, and zinc is made. The difference in the analyses is pointed out and the possible influence on the soil is discussed.

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Ammonium Nitrate Boosts Yields of Corn

From an investment of $1.70, Letcher Watkins of Hickman County, Kentucky, got back $32, according to figures submitted by County Agent Warren Thompson. Where Mr. Watkins plowed under 125 pounds of ammonium nitrate to the acre, his corn produced 68 bushels to the acre. Where no fertilizer was used, the yield was 36 bushels.

Applying Fertilizer by Plane

Airplanes were used in Arkansas County last spring to plant and fertilize farm crops, according to the Extension Service of the Arkansas College of Agriculture. Lespedeza seed was sown in 7,150 acres by this means, nitrogen fertilizer was broadcast over 2,929 acres of oats and superphosphate over 257 acres of lespedeza. About 293,000 pounds of nitrogen material were broadcast at the rate of 100 pounds per acre, 30 acres per hour. The cost of applying seed and fertilizer, including the saving in seed, was approximately $1.00 per acre. This is somewhat higher than the cost for ordinary methods of planting and fertilizing, according to the county agent, W. F. Wright, but it is estimated that 258 man-days of labor were saved, an important item during wartime. Because of the moist condition of the soil, due to continuous rains, it would have been impossible to do the job with the usual wheeled farm machinery.

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See Page 4

PASTURE FERTILIZATION

(Continued from page 11)

barrels per acre. When oats were added and adequately fertilized for winter grazing, a nearly year-around grazing system was established. Generous applications of fertilizer on timely supplementary grazing crops are usually reflected, not only in more uniform production but in increased yields of the crops that follow.

Fertilize in the Fall]

Intensive use of supplementary grazing crops is necessary for uniform production during periods when permanent pastures are not at their best—usually during late summer, fall, and early spring. Here in the South, fertilization of small grains can be followed more widely to give grazing when needed most, to insure a good stand, to prevent erosion, and to save man and machine labor. Over 445,000 acres of winter grazing crops, mostly small grains, were used in Alabama last winter. The value of winter grazing per acre was $19.63, production per cow was 0.8 gallons more milk per day, and 74 farm demonstrators stated nitrogen and top dressing in fall increased growth 42 per cent. Winter grazing furnished 50 per cent of the feed required for farms in the Tennessee watershed. Recent Alabama, Georgia, Louisiana, and North Carolina data indicate that highest grain yields follow spring application of nitrogen, but most grazing and feed production is obtained when more of the fertilizer is applied early in the fall, with top dressing when the grain is up and again in the late winter.

Practically all States now recommend fall or winter top dressing for permanent pastures and hayfields. Fall application gives more time for the fertilizer to penetrate, and at this season more labor is available and the ground is usually firm enough to facilitate distribution. It would be a definite advantage to both the industry and the farmer to store the fertilizer directly on the land rather than in warehouse or farm shed.

How to Fertilize

Experimental work of the Ohio Station showed no advantage in the placement of fertilizer in permanent pastures more than 1 to 2 inches deep. In a wet year surface application was preferable. In recent Vermont studies, 2 years' work showed shallow placement of fertilizer for alfalfa to be effective, while the plowing under of fertilizer gave greater response during the third year, with promise of greater longevity. Applying fertilizer on the bottom of the furrow at time of late summer or fall plowing for new seedings will help distribute fertilizer sales. More research may show the practicability of placing fertilizer deep for some legumes and grasses, especially in the drier areas. The grain drill with large fertilizer box set to place fertilizer 2 to 3 inches deep is satisfactory for most new seedings and supplementary grazing crops. But for permanent rough grassland there is need for machinery to more evenly distribute the heavier amounts of more concentrated fertilizers now used.

There are many other problems in pasture management involving regulated grazing, weed control, addition of adapted seeds, water run-off and drainage, but the greatest is insufficient growth. Agricultural science will find a way to distribute fertilizer more efficiently just as it has now shown that the best way to feed livestock is to feed the soil first. Poor soils make poor feeds and unprofitable livestock. Better nutrition should start at the grass roots, with soil deficiencies made up by increasing the supply of nutrients.

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PRODUCTION OF CORN IN THE SOUTH

(Continued from page 9)

of the other nutrients. Yield data showed that the soils chosen for these experiments already contained enough mineral nutrients without additional fertilization to support the maximum yields obtained. Within considerable range, yields were determined by the amount of nitrogen supplied. Seasonable conditions at the different locations varied from one in which severe droughts were encountered in June and August, to one in which moisture was almost ideal, with many gradations between. Detailed reports on these experiments have been published in *Agronomy Information Circular No. 139* (*3*). I will mention only a few of these at this point.

On a Lloyd clay loam in Davie County, rainfall distribution was irregular and poorly distributed. A severe drought in June limited stalk growth and a second severe drought in August during late pollination and roasting ear stage limited ear development. In spite of this, yields with 0, 20, 40, 80, and 120 pounds of nitrogen were 18, 30, 45, 48, and 51 bushels per acre, respectively.

On a Norfolk sandy loam in Hoke County where moisture conditions were very good, yields for the same amounts of nitrogen were 19, 27, 45, 82, and 107 bushels, respectively. On a Norfolk sandy loam in Johnston County, where rainfall during June, July and August was only 65 per cent of normal, yields for 0, 60, and 120 pounds of nitrogen were 31, 66, and 74 bushels per acre.

The results from all eleven experiments under a wide variety of seasonal conditions are averaged in Table 6 along with a partial economic analysis. I wish to draw attention to the fact that the fixed costs per acre are almost constant. A moderate investment in fertilizers on a small acreage can substitute for the cultivation of a considerably larger acreage. Thus the fertilizer used can, in effect, perform a lot of the labor necessary in making the corn crop and in addition return a handsome profit on the investment.

The North Carolina Extension Program in 1945

The fact that the 1944 experiments just referred to represented such a variety of seasonal conditions and yet, throughout, showed good economic returns gave us courage to embark on an intensive extension program on corn production in 1945. This program was supported strongly by the Extension Director. Dr. E. R. Collins prepared specifications for demonstrations in which it was suggested that the best adapted hybrid for the locality be used, plant population be high enough for good yield, adequate fertilization

TABLE 6

Summary of 1944 Corn Fertilizer Experiments

Pounds of nitrogen applied per acre	0	20	40	60	80	120
Average yield (11 experiments) in bus. per acre.	21	32	48	59	63	72
Value of corn at $1.50 a bushel	$31.50	$48.00	$72.00	$88.50	$94.50	$108.00
Fixed cost of production per acre[1]	9.00	9.00	9.00	9.00	9.00	9.00
Cost of mule power at 22 cents an hour[2]	8.40	8.60	8.70	8.80	8.90	9.00
Approximate cost of phosphate and potash[3]	1.55	2.50	3.70	4.60	5.10	5.65
Approximate cost of nitrogen as soda	0	2.50	5.00	7.50	10.00	15.00
Returns for labor and profit	12.55	25.40	45.60	58.60	61.50	69.35
Cost of man labor at 30 cents an hour	12.10	13.10	13.80	14.30	14.80	15.10
Net Profit per Acre	.45	12.30	31.80	44.30	46.70	54.25
Total cost of production per bushel	1.48	1.11	.84	.75	.76	.75

[1]Includes use of land, equipment, buildings and cost of hybrid seed.

[2]Man and mule labor cost for all operations. (Fixed cost and labor costs obtained from Agricultural Economics Department.)

[3]This represents about 1½ times the amount of phosphoric acid and 1¾ the amount of potash actually removed by the average yields shown.

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at planting be provided, cultivation be shallow so as to avoid excessive root pruning, and top-dressing with nitrogen be in proportion to expected yield increases, usually 60 to 80 pounds of nitrogen per acre. It was suggested that one acre be treated in this manner and be compared with the farmers' usual practice on land which would not be expected to produce over 30 to 35 bushels per acre with the usual practices.

The county agents, white and colored, were called together in groups and the experimental data presented. Demonstration plans were discussed and each agent was asked to carry out at least four demonstrations in his county. Many exceeded this figure and present information indicates that around 600 such demonstrations were carried out.

In order to assure the availability of seed of adapted hybrids for the demonstrations, the Plant Food Institute of North Carolina and Virginia provided funds for the purchase of seed. This was distributed through the county agents to the cooperating farmers.

Reports on the results of these demonstrations have been coming in recently. The interest and effect of these demonstrations have exceeded expectations this year. The agents generally appear optimistic about working out practical systems of consistently producing yields of 60 to 80 bushels of corn per acre economically on most of the soils on which corn will be grown. Some will fall short of this while many others will exceed it by a considerable margin.

We have set as our goal that we will at least double our average corn yield for North Carolina within the next decade. We believe that this is easily possible. The fertilizer industry can and must play a prominent role in this program. When we have gone that far toward meeting our own challenge, then we can take stock and see whether we wish to challenge the corn belt.

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NOVEMBER TAG SALES

(Continued from page 16)

duction and distribution of fertilizer over a larger period than was the practice in pre-war years.

The change in the seasonal distribution of fertilizer tax tags is clearly shown in the following tabulation. Sales in each month are shown as percentages of total annual sales. The upper line shows the average figures for the years 1943 and 1944 while the lower line shows the comparable figures for the years 1936, 1937 and 1938, the last three pre-war years.

	Jan.	Feb.	Mar.	Apr.
1943–1944..	15.3	18.2	17.7	10.9
1936–1938..	7.9	13.4	31.0	22.5
	May	June	July	Aug.
1943–1944..	5.9	2.1	2.2	3.4
1936–1938..	6.0	2.0	1.1	2.8
	Sept.	Oct.	Nov.	Dec.
1943–1944..	4.4	4.2	6.9	8.8
1936–1938..	4.5	2.8	2.3	3.7

In past years the total quantity of fertilizer used in any year has tended to fluctuate directly with farm income. It is now forecast by the U. S. Department of Agriculture that farm cash income in 1946 will likely be about 10 to 15 per cent below 1945. It is doubtful, however, if the past relationship between farm income and fertilizer consumption will hold or if fertilizer tonnage will accordingly decline. The U. S. Department of Commerce predicts that the demand for fertilizer next spring will be heavier than ever. According to the Department of Agriculture, "Fertilizer supplies for crops to be harvested in 1946 are now expected to be 10 or 12 per cent above the quantities used in 1945."

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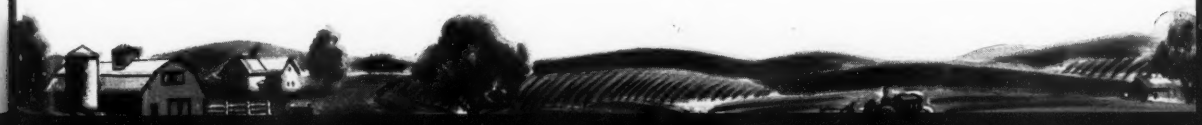

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